AMENDMENTS TO THE DRAWINGS

The attached two sheets of Drawings include changes to Figs. 1-5.

The sheet, which includes Figs. 1-3, replaces original sheet including Figs. 1-3. In Figs. 1 and 2, the previously omitted Legend --PRIOR ART-- has been added. In Figs. 1-3, the previously omitted --.-- at the end of the legend --FIG-- has been added.

The sheet which includes Figs. 4-5 replaces original sheet including Figs. 4-5. In the Figs. 4-5, the previously omitted --.-- after the legend -- FIG-- has been added.

Attachment: two replacement sheets.

REMARKS/ARGUMENTS

This case has been carefully reviewed and analyzed in view of the Office Action dated 17 April 2008.

In the Official Action, the Examiner objected to the Drawings because Figs. 1 and 2 should be designated by a Legend such as --PRIOR ART--. Accordingly, the previously omitted Legend --PRIOR ART-- has been added to Figs. 1-2. In addition, the Applicant amended Figs. 1-5 to add --.-- at the end of the Legend --FIG--.

In the Official Action the Examiner rejected Claims 1, 3-6, and 8-11 under 35 U.S.C. § 102(e) as being anticipated by Lee, et al, U.S. Patent 6,646,770. In addition, the Examiner rejected Claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Lee, et al. in view of Stavely, et al., U.S. Patent 5,969,372. Further, Claim 7 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee, et al. in view of the Applicant's admitted prior art, further referred to herein as AAPA.

Prior to discussion of the cited prior art and the distinguishing features of the claimed device over the cited prior art, it is believed to be beneficial to briefly discuss the method for controlling the on/off function of an LED light source in a scanner.

The method in question takes use of a white light LED as a light source in a scanner wherein the white light LED is switched on/off in a controlled fashion to obtain the most benefits of the operational mode of the white light LED.

Specifically, the operation of the white light LED is synchronized with the scanner sensor receiving the optical signals so that when the image sensor of the scanner ceases to receive the optical signals, the white light LED is switched OFF to dissipate heat during its OFF period. The ON/OFF frequency of the white light LED may be altered according to the frequency of the scanner sensor receiving the optical signals.

In one embodiment of the present method shown in Figs. 3 and 4, the white light LED is switched OFF when the time pulse signal is at its high potential. When the time pulse signal reaches a low potential, the white light LED is switched ON to emit light so that the image sensor of the scanner receives the light emitted from the white light LED and operates to read the optical signals. Every time when the time pulse signal reaches the low potential, the scanner reads sequentially the red light signal, green light signal, and blue light signal to complete one reading cycle as shown in Fig. 3.

As shown in Fig. 4, illustrating an alternative embodiment of the present method, when the time pulse signal is at the low potential, the white light LED may be switched on/off multiple times during the full reading cycle to permit the increased frequency for the scanner reading.

In a third embodiment of the present method, shown in Fig. 5, the scanner may use red light LED, green light LED, and blue light LED, as a light source. When the image sensor of the scanner receives the output signal, either red, green, or blue, a respective red, green or blue LED is switched ON and OFF in accordance with the data reading frequency of the scanner. Each red, green, and blue LED may be switched several times during the low potential portion of the time signal.

Lee, et al., a main reference cited by the Examiner, is directed to a light emitting diode light source control method applicable to a scanner which uses red light LED, green light LED, and blue light LED as light sources. In Lee, et al., the control arrangement turns on the red color LED and processes the data generated by the illumination of the blue color LED during time interval T1. Then the red color LED is turned off and the green color LED is turned on and the data generated by the illumination of the red color LED during time interval T2 is processed. Further, the green color LED is turned off and the blue color LED is turned on and the data generated by the illumination of the green color LED during time interval T3 is processed.

It is respectfully submitted, that Lee, et al. fails to suggest, disclose or render obvious the method of the present invention. Specifically:

In contradistinction with the present invention, in Lee, et al., during the ON mode of operation of the red color LED, the sensor processes the data generated

by the illumination of the blue color LED. In the next time interval when the red LED is off and the green LED is on, the sensor processes the signal generated by the illumination of the red color LED in previous time interval. During the intervals T1 and T2, the blue LED is off and is turned on in the interval T3 when the red LED is off and green LED is off, and the green signal is processed in the sensor. This method is very complex and involves a costly control scheme.

Quite to the contrary to the burdensome control method presented in Lee, et al., involving desynchronization between the ON mode of a specific color LED and processing of the optical signal corresponding thereto, in the present method, as shown in Figs. 3 and 4, during each time interval the white LED is turned ON/ OFF at least once during the reading cycle when the scanner sensor receives and processes all three, e.g. red, green and blue, data outputs. This scheme is much less complex than the one presented in Lee, et al., as it permits a simplified synchronization of operation of the white LED and the scanner sensor.

In the present method, the white light LED is switched ON and OFF at least once (as in Fig. 3) or multiple times (as shown in Fig. 4) during a predetermined time interval, corresponding to a complete reading cycle while a complete sequence of red, green and blue optical signals is received by the scanner. This feature is not shown in Lee, et al..

Further, in contrast to the present method, Lee, et al. uses red, blue and green LEDs, but fails to employ a white light LED to illuminate an object in the scanner.

While in the present invention, white LED is used as a source of the illumination.

The Examiner admits that Lee, et al. is deficient in showing the white light LED as an illumination source and cites for this purpose Stavely, et al. which discloses a film scanner adapted for detecting surface defects and artifacts on a transmissive image in an optical image scanner and for correcting the resulting scanned image. The Stavely, et al. operates to first scan the image normally in one scan. In a second scan step, surface defects and artifacts are detected by providing separate scan using infrared light or by measuring light (white or infrared) that is scattered or diffracted by the defect and artifacts. Image processing may then be used to correct areas in the normal scan corresponding to defects identified in the additional scan.

It is respectfully submitted, that although suggesting using the white light LED for scanning, Stavely, et al. never teaches or renders obvious the method of on/off switching of the white light LED similar to the present method in which white light LED would be switched at least once or multiple times ON and OFF during a time interval when a complete sequence of red, green and blue optical signals of the reading cycle is collected by the scanner. Therefore even if to

modify the scheme presented in Lee, et al. (which itself fails to use a white LED as an illumination source) with the white LED used in Stavely, et al., this combination of reference still is deficient in switching the white LED ON and OFF during a predetermined reading cycle time interval when a complete sequence of red, green and blue optical signals of the reading cycle is received by the scanner as it is the case in the present control method.

The Examiner further admitted that Lee, et al. is deficient in the step of reading the R/G/B optical signals. For this purpose the Examiner cited the Applicant's admitted prior art. It is respectfully submitted, that in the AAPA, in contrast to the present invention, the white LED is never switched on or off and is merely continuously lighted while R/G/B signals are read thereby presenting a heating problem which the present invention solves by switching the white LED on and off in a predetermined fashion during the time interval when the reading cycle sequence of red, green and blue optical signals is received at the scanner sensor.

Newly amended Claim 1 clearly emphasizes the step completely missing in the cited references, Lee, et al., Stavely, et al., as well as the AAPA, taken solely or in their combination by citing (inter alia):

"…switching the white light LED ON and OFF at least once during a predetermined reading cycle time interval while a complete sequence of optical signals of the reading cycle of the scanner is received by the scanner."

As Lee, et al., or Stavely, et al., or AAPA do not disclose each and every element of the subject Patent Application as now claimed, it cannot anticipate it. Further, as any of the cited reference, as well as the AAPA, or their combinations, fail to suggest the unique concatenation of interrelated elements for the stated purposes and objectives, they are not believed to make the instant invention obvious either.

Since none of the cited prior art taken singly or in combination teaches, suggests or renders obvious the claimed method, Claim 1 is believed to be allowable over the cited prior art; and the same is respectfully requested.

Claim 2 has been canceled without prejudice to incorporate the subject matter thereof into Claim 1. Claim 3 has been canceled without prejudice or disclaimer of the subject matter thereof.

Claims 4-11 dependent upon Claim 1 are believed to show further patentable distinctions, and are believed allowable for at least the reasons presented supra.

New Claims 12-16 have been added for further prosecution with the Claims 1 and 4-11. Claims 12-16 cover the embodiments of the present invention shown in Figs. 4 and 5.

The new Independent Claim 12 calls for (among other):

"… switching the LED light source ON and OFF multiple times while an optical signal is received by the scanner".

This feature is not shown by prior art cited by the Examiner taken singly or in combination thereof. Therefore, Claim 12, as well as dependent Claims 13-16, are believed to be allowable over the cited prior art; and the same is respectfully requested.

For all of the foregoing reasons it is therefore now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

No fees are believed to be due with this Amendment. If there are any charges associated with this filing, the Honorable Commissioner for Patents is hereby authorized to charge Deposit Account #18-2011 for such charges.

Respectfully submitted,
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07/16/2008
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